

Claims

1. A process for producing a metal wire comprising a steel core and a metal coating layer in a radially outer position with respect to said steel core, the metal coating layer comprising an alloy made of at least two metal components, said process comprising the steps of:
 - coating the steel core by depositing onto said steel core separate layers, each layer being made of at least one metal component of said at least two metal components, each layer having a thickness not higher than 50 nm, and
 - drawing the coated core to form said alloy.
2. Process according to claim 1, wherein said thickness is comprised between 0.5 nm and 20 nm.
3. Process according to claim 2, wherein said thickness is comprised between 1.0 nm and 10 nm.
4. Process according to claim 1, wherein the step of coating is carried out by alternately depositing onto said steel core said separate layers.
5. Process according to claim 1, wherein at least one of the separate layers is made of an alloy made of said at least two metal components.
6. Process according to claim 1, wherein the step of coating is carried out by means of a plasma deposition technique.
7. Process according to claim 6, wherein said plasma deposition technique is selected from: sputtering, evaporation by voltaic arc, plasma spray and plasma enhanced chemical vapor deposition (PECVD).
8. Process according to claim 6, wherein the step of coating is carried out in at least one vacuum deposition chamber at a first predetermined pressure.
9. Process according to claim 8, wherein said first predetermined pressure is comprised in the range from about 10^{-3} to about 10^{-1} mbar.
10. Process according to claim 1, wherein the steel core is continuously coated and

drawn while being conveyed at a speed comprised in the range from about 10 to about 80 m/min.

11. Process according to claim 1, wherein the steel core has a predetermined initial diameter, the coating layer has a predetermined initial thickness, and the step of drawing
5 the coated core is carried out until the steel core has a final diameter smaller than said predetermined initial diameter and the metal coating layer has a final thickness smaller than said predetermined initial thickness.

12. Process according to claim 11, wherein the predetermined initial thickness of the coating layer is comprised between about 0.5 and about 2.0 mm.

10 13. Process according to claim 11, wherein the final thickness of the coating layer is comprised between about 80 and about 350 nm.

14. Process according to claim 11, wherein the predetermined initial diameter of the steel core is comprised in the range from about 0.85 and about 3.00 mm.

15 15. Process according to claim 11, wherein the predetermined final diameter of the steel core is comprised in the range from 0.10 to 0.50 mm.

16. Process according to claim 8, further comprising a step of conveying the steel core in at least one pre-chamber at a second predetermined pressure higher than said first predetermined pressure, said pre-chamber being arranged upstream of said at least one vacuum deposition chamber.

20 17. Process according to claim 16, wherein said second predetermined pressure is comprised between about 0.2 mbar to about 10 mbar.

25 18. Process according to claim 8, wherein the steel core is made to pass through a sequence of at least two cathodes arranged inside the vacuum deposition chamber, each cathode being made of a metal component of said at least two metal components to be deposited onto the steel core.

19. Process according to claim 8, wherein the steel core passes through the vacuum chamber according to multiple passages.

20. Process according to claim 1, wherein said alloy forming the coating layer is different from the steel forming the core.

21. Process according to claim 1, wherein the metals of the coating layer are selected from: copper, zinc, manganese, cobalt, tin, molybdenum, iron, nickel, aluminum and alloys thereof.

22. Process according to claim 21, wherein the coating layer is made of brass.

5 23. Process according to claim 22, wherein the brass has a copper content of from about 60 to about 72% by weight.

24. Process according to claim 1, further comprising the step of submitting the steel core to at least one surface treatment.

10 25. Process according to claim 24, wherein said at least one surface treatment comprises the step of pickling the core into a pickling bath.

26. Process according to claim 25, further comprising the step of washing the pickled core into water.

27. Process according to claim 26, further comprising the step of drying the washed core.

15 28. Process according to claim 1, further comprising the step of thermally treating the steel core.

29. Process according to claims 24 and 28, wherein the step of thermally treating the steel core is carried out after the step of submitting the steel core to the least one surface treatment.

20 30. Process according to claim 28, further comprising the step of dry drawing the steel core before carrying out the thermal treatment step.